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EXAMINER

ZERVIGON, RUDY

ART UNIT	PAPER NUMBER
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1763

DATE MAILED: 06/05/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/821,310

Applicant(s)

BERA ET AL.

Examiner

Rudy Zervigon

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 03 May 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-3,5-11,13-16 and 18-25 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3,5-11,13-16 and 18-25 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on May 3, 2006 has been entered.

Claim Rejections - 35 USC § 102

2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

3. Claim 23 is rejected under 35 U.S.C. 102(b) as being anticipated by Komino; Mitsuaki et al. (US 6,156,151 A). Komino teaches a semiconductor substrate processing system (Figure 1; column 3, line 60 - column 4, line 54) comprising: a processing chamber (CC; Figure 1) a substrate support pedestal (114; Figure 1, 4) disposed in the chamber (CC; Figure 1); a gas inlet (106; Figure 2) formed in the chamber (CC; Figure 1) above the pedestal (114; Figure 1, 4) for supplying a process gas into a process region (101; Figure 1) above the support pedestal (114; Figure 1, 4); an exhaust port (112a, 2; Figure 1) formed in a wall of the chamber (CC; Figure 1) and a restrictor plate (118a portion of 118; Figures 2-4, column 6, lines 26-41) supported within the semiconductor processing chamber (CC; Figure 1) in a laterally spaced-apart relation relative to the substrate support pedestal (114; Figure 1, 4) and sidewalls of the processing chamber (CC; Figure 1), the restrictor plate (118a portion of 118; Figures 2-4, column 6, lines 26-41) at least

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partially circumscribing the substrate support pedestal (114; Figure 1, 4) and adapted to control the flow of at least one gas flowing between the process region (101; Figure 1) and the exhaust port (112a, 2; Figure 1), as claimed by claim 23.

Claim Rejections - 35 USC § 103

4. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

5. Claims 23 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Li; Yicheng et al. (US 6448536 B2). Li teaches a semiconductor substrate processing system (Figure 1; column 4, lines 13-33) comprising: a processing chamber (2; Figure 1) a substrate support pedestal (3; Figure 1) disposed in the chamber (2; Figure 1); a gas inlet (21; Figure 1) formed in the chamber (2; Figure 1) above the pedestal (3; Figure 1) for supplying a process gas into a process region (2; Figure 1) above the support pedestal (3; Figure 1); an exhaust port (27a; Figure 1) formed in a wall (1; Figure 1) of the chamber (2; Figure 1) and the restrictor plate (26; Figure 1,2; column 5; lines 35-54) at least partially circumscribing the substrate support pedestal (3; Figure 1) and adapted to control the flow of at least one gas flowing between the process region (2; Figure 1) and the exhaust port (27a; Figure 1), as claimed by claim 23. Li further teaches the system (Figure 1; column 4, lines 13-33) of claim 23, wherein the restrictor plate (26; Figure 1,2; column 5; lines 35-54) further comprises a plurality of removable arc segments – Figure 2 shows element 26 separated at 120° increments, as claimed by claim 24

Lee does not teach a restrictor plate (26; Figure 1,2; column 5; lines 35-54) supported within the semiconductor processing chamber (2; Figure 1) in a laterally spaced-apart relation relative to

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the substrate support pedestal (3; Figure 1) and sidewalls of the processing chamber (2; Figure 1).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to optimize the dimension(s) of Lee's restrictor plate (26; Figure 1,2; column 5; lines 35-54).

Motivation to optimize the dimension(s) of Lee's restrictor plate (26; Figure 1,2; column 5; lines 35-54) is for controlling exhaust flow across 26 as taught by Lee (column 5; lines 27-35).

6. Claims 1-3, 5, 6, 9-11, 14-16, 18, and 25-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Komino; Mitsuaki et al. (US 6,156,151 A) in view of Yonenaga; Tomihiro et al. (US 5972114 A). Komino teaches Apparatus (Figure 1; column 3, line 60 - column 4, line 54) for controlling the flow of a gas between a process region (101; Figure 1) and an exhaust port (112a, 2; Figure 1) in a semiconductor substrate processing chamber (CC; Figure 1), comprising; at least one restrictor plate (118a portion of 118; Figures 2-4, column 6, lines 26-41) supported within the semiconductor processing chamber (CC; Figure 1) and adapted to at least partially circumscribe a substrate support pedestal (114; Figure 1, 4), the restrictor plate (118a portion of 118; Figures 2-4, column 6, lines 26-41) adapted to control the flow of at least one gas flowing between the process region (101; Figure 1) and the exhaust port (112a, 2; Figure 1), as claimed by claim 1

Komino further teaches:

- i. The apparatus (Figure 1; column 3, line 60 - column 4, line 54) of claim 1, further comprising: a base (LC; Figure 1) adapted to be coupled to a bottom of the processing chamber (CC; Figure 1); and a support ring (111b; Figure 1,2) coupled to the base (LC; Figure 1) in a vertically spaced apart orientation, wherein the at least one restrictor plate

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(118a portion of 118; Figures 2-4, column 6, lines 26-41) is coupled to the support ring (111b; Figure 1,2), as claimed by claim 2

- ii. The apparatus (Figure 1; column 3, line 60 - column 4, line 54) of claim 2, wherein the at least one restrictor plate (118a portion of 118; Figures 2-4, column 6, lines 26-41) is configured to be laterally spaced apart from the substrate support pedestal (114; Figure 1, 4) and an interior wall of the processing chamber (CC; Figure 1), as claimed by claim 3
- iii. The apparatus (Figure 1; column 3, line 60 - column 4, line 54) of claim 1, wherein the at least one restrictor plate (118a portion of 118; Figures 2-4, column 6, lines 26-41) having an annular shape which at least partially circumscribes the substrate support pedestal (114; Figure 1, 4), as claimed by claim 6
- iv. The apparatus (Figure 1; column 3, line 60 - column 4, line 54) of claim 1, wherein the at least one restrictor plate (118a portion of 118; Figures 2-4, column 6, lines 26-41) further comprises a plurality of restrictor plates (118a portion of 118; Figures 2-4, column 6, lines 26-41), wherein each restrictor plate (118a portion of 118; Figures 2-4, column 6, lines 26-41) abuts at least one other restrictor plate (118a portion of 118; Figures 2-4, column 6, lines 26-41), as claimed by claim 9
- v. The system (Figure 1; column 3, line 60 - column 4, line 54) of claim 10, wherein the at least one restrictor plate (118a portion of 118; Figures 2-4, column 6, lines 26-41) is a plurality of restrictor plates (118a portion of 118; Figures 2-4, column 6, lines 26-41) having an arcuate shape, as claimed by claim 14
- vi. The system (Figure 1; column 3, line 60 - column 4, line 54) of claim 14, wherein the plurality of restrictor plates (118a portion of 118; Figures 2-4, column 6, lines 26-41)

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substantially surround the substrate support pedestal (114; Figure 1, 4), as claimed by claim 15

- vii. The system (Figure 1; column 3, line 60 - column 4, line 54) of claim 15, wherein at least a portion of an outer edge of the plurality of restrictor plates (118a portion of 118; Figures 2-4, column 6, lines 26-41) reduces a gap defined between the outer edge and an inner wall of the chamber (CC; Figure 1) proximate the exhaust port (112a, 2; Figure 1), as claimed by claim 16
- viii. The system (Figure 1; column 3, line 60 - column 4, line 54) of claim 10, wherein the one restrictor plate (118a portion of 118; Figures 2-4, column 6, lines 26-41) has an annular shape which substantially surrounds the substrate support pedestal (114; Figure 1, 4), as claimed by claim 18

Komino does not teach a plurality of support pins supporting Komino's restrictor plate (118a portion of 118; Figures 2-4, column 6, lines 26-41) as claimed by amendend claim 1.

Komino further does not teach:

- i. The apparatus (Figure 1; column 3, line 60 - column 4, line 54) of claim 3, wherein the support pins (113, 116; Figure 2) retain the supporting ring (111b; Figure 1,2) in a non-parallel orientation with respect to a plane defined by a substrate support (114; Figure 1, 4) surface of the substrate support pedestal (114; Figure 1, 4), as claimed by claim 5
- ii. A semiconductor substrate processing system (Figure 1; column 3, line 60 - column 4, line 54) comprising: a processing chamber (CC; Figure 1); a substrate support pedestal (114; Figure 1, 4) disposed in the chamber (CC; Figure 1); a gas inlet (106; Figure 2) formed in the chamber (CC; Figure 1) above the pedestal (114; Figure 1, 4) for supplying

a process gas into a process region (101; Figure 1) above the support pedestal (114; Figure 1, 4); an exhaust port (112a, 2; Figure 1) formed in a wall of the chamber (CC; Figure 1) and at least one restrictor plate (118a portion of 118; Figures 2-4, column 6, lines 26-41) supported within the semiconductor processing chamber (CC; Figure 1) by a plurality of support pins and at least partially circumscribing the substrate support pedestal (114; Figure 1, 4), the restrictor plate (118a portion of 118; Figures 2-4, column 6, lines 26-41) adapted to control the flow of at least one gas flowing between the process region (101; Figure 1) and the exhaust port (112a, 2; Figure 1), as claimed by claim 10

- iii. The system (Figure 1; column 3, line 60 - column 4, line 54) of claim 10, further comprising: a base (LC; Figure 1) adapted to be coupled to a bottom of the processing chamber (CC; Figure 1); and a support ring (111b; Figure 1,2) coupled to the base (LC; Figure 1) via a plurality of support pins in a vertically spaced apart orientation wherein the at least one restrictor plate (118a portion of 118; Figures 2-4, column 6, lines 26-41) is coupled to the support ring (111b; Figure 1,2), as claimed by claim 11
- iv. The system (Figure 1; column 3, line 60 - column 4, line 54) of claim 23 further comprising: a plurality of support pins coupling the restrictor plate (118a portion of 118; Figures 2-4, column 6, lines 26-41) to a bottom of the processing chamber (CC; Figure 1), as claimed by claim 25
- v. The apparatus of claim 1, wherein a length of the support pins is adjustable, as claimed by claim 26

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- vi. The apparatus of claim 1, wherein the restrictor plate (118a portion of 118; Figures 2-4, column 6, lines 26-41) has an oval profile, as claimed by claim 27
- vii. A semiconductor substrate processing system, comprising: a processing chamber (CC; Figure 1); a substrate support pedestal (114; Figure 1, 4) disposed in the processing chamber (CC; Figure 1); a gas inlet (106; Figure 2) formed in the processing chamber (CC; Figure 1) above the pedestal for supplying a process gas into a process region (101; Figure 1) defined in the processing chamber (CC; Figure 1) above the support pedestal (114; Figure 1, 4); an exhaust port (112a, 2; Figure 1) formed in a wall of the processing chamber (CC; Figure 1); a restrictor plate (118a portion of 118; Figures 2-4, column 6, lines 26-41) supported within the processing chamber (CC; Figure 1) in a laterally space-apart relation relative to the support pedestal (114; Figure 1, 4) and sidewalls of the processing chamber (CC; Figure 1), the restrictor plate (118a portion of 118; Figures 2-4, column 6, lines 26-41) at least partially circumscribing the substrate support pedestal (114; Figure 1, 4) and positioned above the exhaust port (112a, 2; Figure 1); and a plurality of pins extending between the restrictor plate (118a portion of 118; Figures 2-4, column 6, lines 26-41) and a bottom of the processing chamber (CC; Figure 1), as claimed by claim 28

Yonenaga teaches a plurality of support pins ("column" – see plural 48 Figure 1, column 4, lines 4-17) supporting Komino's restrictor plate (46; Figure 1, column 4, lines 4-17).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to add Yonenaga's support pins to Komino's restrictor plate (118a portion of 118; Figures 2-4, column 6, lines 26-41).

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Motivation to add Yonenaga's support pins to Komino's restrictor plate is for adding additional support means in addition to Komino's support means (118b; Figure 2).

7. Claims 7, 8, 13, and 19-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Komino; Mitsuaki et al. (US 6,156,151 A) in view of Yonenaga; Tomihiro et al. (US 5972114 A). Komino is discussed above. Komino does not teach:

- i. The apparatus (Figure 1; column 3, line 60 - column 4, line 54) of claim 6, wherein the restrictor plate (118a portion of 118; Figures 2-4, column 6, lines 26-41) has a width that is wider at one portion of the restrictor plate (118a portion of 118; Figures 2-4, column 6, lines 26-41) than at another portion of the restrictor plate (118a portion of 118; Figures 2-4, column 6, lines 26-41), as claimed by claim 7
- ii. The apparatus (Figure 1; column 3, line 60 - column 4, line 54) of claim 7, wherein the portion having the wider width is adapted for positioning proximate the exhaust port (112a, 2; Figure 1), as claimed by claim 8
- iii. The system (Figure 1; column 3, line 60 - column 4, line 54) of claim 11, wherein the support pins (113, 116; Figure 2) retain the substrate supporting ring (111b; Figure 1,2) non-parallel with respect to a plane defined by a support surface of the substrate support pedestal (114; Figure 1, 4), as claimed by claim 13
- iv. The system (Figure 1; column 3, line 60 - column 4, line 54) of claim 18, wherein the one restrictor plate (118a portion of 118; Figures 2-4, column 6, lines 26-41) has a width that is wider at one portion of the one restrictor plate (118a portion of 118; Figures 2-4, column 6, lines 26-41) than at another portion of the one restrictor plate (118a portion of 118; Figures 2-4, column 6, lines 26-41), as claimed by claim 19

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- v. The system (Figure 1; column 3, line 60 - column 4, line 54) of claim 19, wherein the portion having the wider width is positioned proximate the exhaust port (112a, 2; Figure 1), as claimed by claim 20
- vi. The system (Figure 1; column 3, line 60 - column 4, line 54) of claim 20, wherein at least a portion of an outer edge of the one restrictor plate (118a portion of 118; Figures 2-4, column 6, lines 26-41) reduces a gap defined between the outer edge and an inner wall of the chamber (CC; Figure 1) along one section proximate the exhaust port (112a, 2; Figure 1), as claimed by claim 21
- vii. The system (Figure 1; column 3, line 60 - column 4, line 54) of claim 10, wherein the at least one restrictor plate (118a portion of 118; Figures 2-4, column 6, lines 26-41) is one restrictor plate (118a portion of 118; Figures 2-4, column 6, lines 26-41) having an annular shape which completely surrounds the substrate support pedestal (114; Figure 1, 4) and a width that is wider at one portion of the one restrictor plate (118a portion of 118; Figures 2-4, column 6, lines 26-41) than at another portion of the one restrictor plate (118a portion of 118; Figures 2-4, column 6, lines 26-41), and wherein a portion of an outer edge of the one restrictor plate (118a portion of 118; Figures 2-4, column 6, lines 26-41) contacts an inner wall of the chamber (CC; Figure 1) at least in a location proximate the exhaust port (112a, 2; Figure 1), as claimed by claim 22

Yonenaga is discussed above.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to optimize the dimensions of Komino's apparatus parts restrictor plate (118a portion of 118; Figures 2-4, column 6, lines 26-41), and support pins (113, 116; Figure 2).

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Motivation to optimize the dimensions of Komino's apparatus parts restrictor plate (118a portion of 118; Figures 2-4, column 6, lines 26-41), and support pins (113, 116; Figure 2) is for influencing process as flow characteristics of Komino's apparatus as taught by Komino (column 1; lines 51-61). Further, it is well established that changes in apparatus dimensions are within the level of ordinary skill in the art. (Gardner v. TEC Systems, Inc. , 725 F.2d 1338, 220 USPQ 777 (Fed. Cir. 1984), cert. denied , 469 U.S. 830, 225 USPQ 232 (1984); In re Rose , 220 F.2d 459, 105 USPQ 237 (CCPA 1955); In re Rinehart, 531 F.2d 1048, 189 USPQ 143 (CCPA 1976); See MPEP 2144.04)

Response to Arguments

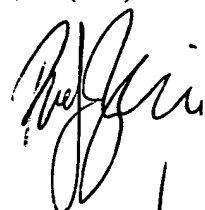
8. Applicant's arguments with respect to claims 26-28 are have been considered but are moot in view of the new grounds of rejection.

9. Applicant states that Komino does not teach "a restrictor plate supported within the semiconductor processing chamber in a laterally spaced-apart relation relative to the substrate support pedestal and sidewalls of the processing chamber ". The Examiner has reconsidered the teachings of Komino who was cited as showing a restrictor plate (118a portion of 118; Figures 2-4, column 6, lines 26-41) supported within the semiconductor processing chamber (CC; Figure 1) in a laterally spaced-apart relation relative to the substrate support pedestal (114; Figure 1, 4) and sidewalls of the processing chamber (CC; Figure 1)

10. With respect to Lee, Applicants state that Lee does not teach "and a restrictor plate supported within the semiconductor processing chamber in a laterally spaced-apart relation relative to the substrate support pedestal and sidewalls of the processing chamber". The Examiner has reconsidered the teachings of Lee. New rejections are proposed above.

Conclusion

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Rudy Zervigon whose telephone number is (571) 272-1442. The examiner can normally be reached on a Monday through Thursday schedule from 8am through 7pm. The official fax phone number for the 1763 art unit is (571) 273-8300. Any Inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Chemical and Materials Engineering art unit receptionist at (571) 272-1700. If the examiner can not be reached please contact the examiner's supervisor, Parviz Hassanzadeh, at (571) 272-1435.


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